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STUDY OF SOME CARDIOVASCULAR RISK FACTORS AMONG TRIBAL AND NON-TRIBAL POPULATION OF 1ST YEAR MEDICAL STUDENTS OF A GOVERNMENT MEDICAL COLLEGE OF JHARKHAND, INDIA

Medical Science

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ABSTRACT

Cardio vascular diseases (CVD) has assumed epidemic proportion in India. It is one of the most important cause of mortality and morbidity in India. The present study is an attempt to look for this recognized factors among young 1st year students. Objective of our study was to evaluate the prevalence of some cardiovascular risk factors including different anthropometric parameters, serum lipid profile among tribal and non-tribal population of 1st year students of RIMS, Jharkhand. 101 students were randomly selected. Anthropometric measurements i.e. Height (Ht), Weight (Wt), Waist circumference (Wc) and Hip Circumference (Hc) were taken. Body mass index (BMI) and Waist-Hip ratio (WHR) was calculated along with estimation of fasting serum lipid profile. Low HDL, a common cardiovascular risk factor, was prevalent among the female students. Female students have significant higher risk of metabolic complication according to WC, where as BMI and WHR fails to show such relation.

KEYWORDS

Cardiovascular risk factor, Lipid profile, Waist-Hip ratio, Waist circumference, HDL, Medical students

1. INTRODUCTION

Prevalence of overweight and obesity has increased significantly in developing countries.[4,5] These are independent risk factors for atherosclerosis and affects many cardiovascular risk factors adversely.[6,7] The worldwide prevalence of obesity more than doubled between 1980 and 2014. In 2014 total 1.9 billion adult aged 18 years and more (38% male and 40% female) were overweight. One of the important risk factor for CVD is raised BMI.[1] Cardiovascular diseases has become the most important cause of mortality worldwide. Over 3/4th of that occurred in low- and middle- income countries.[2] There is an increasing trend of occurrence of CVDs at the younger age group of population. A rapid increase in risk factors in early adulthood is accountable for this which correlates with body mass index, waist circumference and waist hip ratio.[3] In adults fat distribution pattern is an important risk factor for CVD.[8] Adipose tissue in our body store fats which can serve as fuel source in need. But today our sedentary life style, altered food habits, physical inactiveness lead to excess storage of fat reflected as altered body composition which causes increased susceptibility towards different non-communicable diseases including Cardiovascular disease (CVD), Hypertension (HTN), Diabetes mellitus (DM). So body composition is an important determinant of occurrence and the course of different NCDs.[9] Body composition can be easily measured by using simple anthropometric measurement tools like Body mass index (BMI), Waist circumference (WC), Hip circumference (HC) and Waist to hip ratio (WHR). Although BMI, recommended as index of obesity by World health organization [11] is related to risk for NCDs, few studies has shown that the distribution of fat is better predictor for these. These tools are proved to be equally or more effective than other sophisticated techniques. [12-14] One of the major risk factor for CVD is altered lipid profile. Lipid circulate in our body as fatty acids combined with lipoproteins, cholesterol and triglyceride. Lipid profile constitutes of measuring plasma Total cholesterol (TC), Triglyceride (TG), High density lipoprotein (HDL), Low density lipoprotein (LDL) and Very low density lipoprotein (VLDL). Where some of the previous studies have shown significant correlation between those anthropometric measurements and serum lipid profile [15-17], some shows no statistical significant correlation.[18,19]. Various studies were conducted in India relating anthropometric measurements and lipid profile in different diseases [20-22] whereas only few studies were conducted involving healthy subjects [23]. In our present study we have tried to correlate few of these anthropometric variables with lipid profile in apparently healthy young subjects.

2. AIMS AND OBJECTIVE:

1. To measure the different anthropometric variables i.e Body mass index (BMI), Waist circumference (WC), Hip circumference (HC) and Waist-Hip ratio (WHR) of all of the apparently healthy young subjects enrolled in the study.
2. To estimate the fasting serum lipid profile which includes Total cholesterol (TC), Very low density lipoprotein (VLDL), Low density lipoprotein (LDL), High density lipoprotein (HDL) and Triglyceride (TG) of those subjects.
3. To assess different anthropometric variables and lipid profile parameters to check for the presence of any cardiovascular risk factor.

3. MATERIALS AND METHOD:

This cross-sectional , medical college based study was performed at Rajendra Institute of Medical Sciences, Ranchi, Jhakhand during the period of September, 2016 to January, 2017. Necessary permission were taken from Institutional ethics committee. After taking informed consent, apparently healthy subjects perusing M.B.B.S 1st year at the institution were included based on following exclusion criteria.

The subjects with history of any cardiac disease, dyslipidemia, hypertension, diabetes mellitus, renal diseases, carcinoma, or on any medication which may affect the lipid profile and family history of lipid related disorder were excluded from the study. Detailed clinical examination were performed including general survey (Examination of pallor, icterus, clubbing, cyanosis, blood pressure, pulse) and systemic examination (Cardiovascular system, Respiratory system, Abdominal and Nervous system examination). Based on the detailed history taking and clinical examination finally 101 subjects were included in the study.

Waist circumference (WC) was measured at the midpoint between lower costal margin and top of the iliac crest by a stretch resistant tape. Whereas Hip circumference (HC) was measured at the widest portion of the buttocks with tape parallel to the floor. For both of the measurements the subject stood relaxed with feet close together, arms at the side of the body, at the end of normal expiration and wore little clothing.[24] Waist –Hip ratio (WHR) is calculated by the following formula: Waist circumference (cm)/Hip circumference (cm). Height was measured in centimeter by using standard height measuring rods whereas Weight was measured in kilograms by electronic measuring scale, without shoes and preferably in light clothing. Body mass index (BMI) was calculated by the following formula: BMI= (Ht in mt)^2/Wt in kgs

Blood samples were taken from the participants after overnight fasting in sitting posture following standard protocol. The samples were centrifuged within 1hr from the time of collection. The lipid parameters Total cholesterol (TC), Very low density lipoprotein (VLDL), Low density lipoprotein (LDL), High density lipoprotein (HDL) and Triglyceride (TG) were estimated using reagent kit from Coral clinical system using colorimeter.

The data thus collected were analyzed statistically using Statistical package for the Social Sciences (SPSS, ver.20) and was represented as

mean and standard deviation. Pearson correlation test was done for anthropometric variables with each lipid parameter and represented by the correlation coefficient (r); P value < 0.05 was considered statistically significant.

4. OBSERVATION:

Table 1: Lipid profile of the participating male and female students

Lipid (mg/dl)	Male (n=40)	Female (n=61)	Significance
Total cholesterol	163.32 ± 17.804	146 ± 20.024	.001
LDL	96.40 ± 16.350	87.68 ± 19.91	.074
HDL	43.44 ± 2.501	37.97 ± 2.477	.001
VLDL	23.16 ± 1.972	22.74 ± 12.72	.870
TG	116.00 ± 9.587	103.87 ± 13.20	.001

Low HDL, a common cardiovascular risk factor, was prevalent among the female students.Total cholesterol and LDL cholesterol was significantly higher in male students though none of the values were beyond normal range.

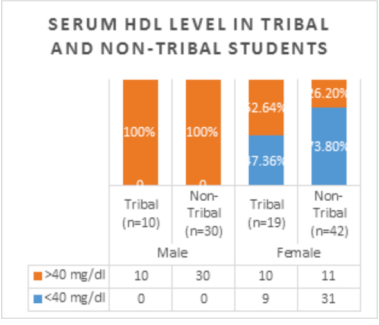

Chart 1: Serum HDL level in Tribal and Non-tribal male and female students

65.57% (40 out of 61) of the female students have HDL cholesterol level <40mg/dl which is a significant cardiovascular risk factor. Lowered HDL level is more pronounced in Non-tribal females (73.80%) than Tribal females (47.36%). HDL values are normal in all of the male students both tribal and non-tribal.

Table 2: World Health Organization cut-off points and risk of metabolic complications[24]

Indicator	Cut-off points (M, Men; W, Women)	Risk of metabolic complications
Waist circumference	>94 cm (M): >80 cm (W)	Increased
Waist circumference	>102 cm (M); >88 cm (W)	Substantially increased
Waist-hip ratio	≥0.90 cm (M); ≥0.85 cm (W)	Substantially increased

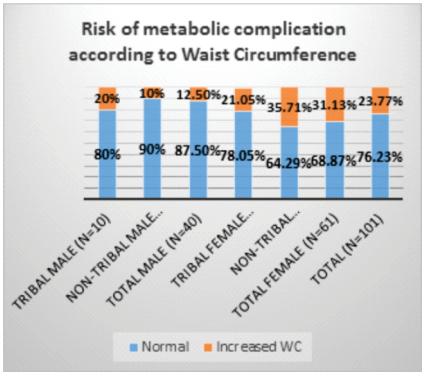

Chart 2: Risk of metabolic complication according to waist circumference

31.13% of female students have increased waist circumference (>80 cm) which is significantly higher than the male students (12.50%). Among the female students Non-tribal female students (35.71%) are more vulnerable to have metabolic complications. Waist-hip ratio also shows similar type of result where more no. of females have increased waist hip ratio beyond the WHO cutoff values.

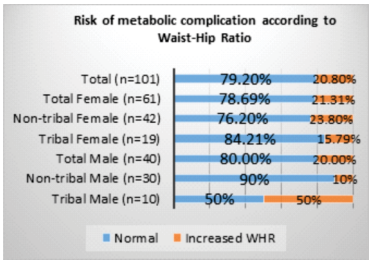

Chart 3: Risk of metabolic complications according to Waist-Hip ratio

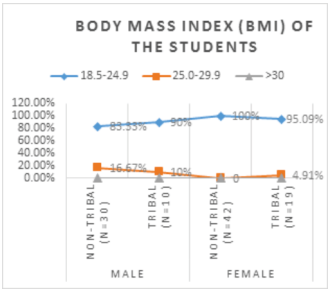

Chart 4: Body mass index (BMI) of the students

Interestingly none of the student are obese. Overweight prevalence is more in male students. 16.67% of non-tribal male students and 10% of tribal male students are overweight. Whereas only 4.91% of tribal female students are overweight.

5. DISCUSSION:

In a study among adults of ≥18 years (n = 200) in a resettlement colony located in central Delhi, 42% had low HDL-C levels (<40 mg/dl) and 38% had high LDL-C (>130 mg/dl) [27]

A study in South India reported that prevalence of either high waist circumference, hyperinsulinemia or dyslipidemia was present in 67.7% of 12–19 years old children (n = 2640), more in overweight vs normal weight children (85% vs 65%) [28] Prevalence of high triglycerides in this study was in 24% and low HDL cholesterol was in 57%.

In Kashmir valley, a study of 5–19 year old children reported that the commonest lipid abnormality in these children was hypertriglyceridemia and low HDL cholesterol, prevalence being 82% in males, 48% in females, and 37% in males and 19% in females, respectively. [29]

Gupta et al. evaluated 1236 adolescents and young adults for dietary, anthropometric and biochemical risk factors 55. Dyslipidemia was defined using >95% percentile values using the same cohort. In male and female adolescents, respectively, high total cholesterol was in 14% and 15%, high LDL cholesterol was in 12% and 13%, high triglycerides in 14% and 16% and low HDL cholesterol was in 5%. [30]

The largest study by ICMR [26] regarding prevalence of dyslipidemia in rural and urban India shows Jharkhand has highest rates of low HDL-C in Jharkhand (76.8%). The study also pointed out the higher incidence of dyslipidemia in younger group of subjects (20-24 years) both males and females.

Although, body mass index (BMI) as a recommended index of obesity by World Health Organization8 is related to disease risk,[31] some studies suggest that the pattern of body fat distribution is a more important determinant of disease risk[32-34] and individuals with a high proportion of abdominal fat have higher risks for developing diabetes, hypertension and CVD.

Unfortunately, there is no standard measure of abdominal obesity that is widely accepted. In our study 47.36% of the tribal female student and 73.80% of non-tribal female student has low HDL level (<40mg/dl) which itself is a cardiovascular risk factor. Risk of metabolic complication is high in 21.05% tribal female students and 35.71% non-tribal female students according to the waist

circumference. When we compare it with the waist-hip ratio increased metabolic is present in 15.79% and 23.80% respectively in tribal and non-tribal female students. From the above data it is evident that the lowered HDL cholesterol level, which is a established cardiovascular risk factor is better reflected by the waist circumference data than other two anthropometric parameter that is waist-hip ratio and BMI. The majority of studies recommend waist circumference (WC) as a better indicator of abdominal obesity and a better predictor for CVD than either BMI or waist-to-hip ratio (WHR),[35-38] Overall risk according to the waist circumference and waist-hip ratio is less among male students compared to female students.

This study thus confirms the findings of several earlier studies that Indians have high prevalence of low HDL cholesterol. This appears to be part of the Asian Indian phenotype [25] which includes increased plasma insulin levels, insulin resistance, increased waist circumference, excess visceral fat and low adiponectin levels.

Another interesting fact is that none of the male students has serum HDL cholesterol below cutoff value i.e. 40mg/dl whereas 40 out of 61 female students (65.57%) have lowered HDL level. Though the previous ICMR study [26] has shown Jharkhand has the highest low HDL-C level in India, no such demarcative result in males and females were stated

Our study also shows that the non-tribal female students have higher risk for metabolic complication including the cardiovascular disease than their tribal counterparts. The apparent better protection for the tribal female students may be attributed to their life style, food habits, physical activity or even genetic make-up. We have not found any previous study regarding these.

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